Radioisotope Brief: Uranium-235 (U-235) and Uranium-238 (U-238)

U-235

Half-life: 700 billion years

U-238

Half-life: 4.47 billion years

Mode of decay: Alpha particles

Chemical properties: Weakly radioactive, extremely dense metal (65% denser than lead)

Alpha Particles are subatomic particles made up of two neutrons and two protons ejected from the nucleus of an unstable atom. They are not able to penetrate most materials—even a piece of paper or the outer layer of human skin can block an alpha particle. However, alpha particles are particularly dangerous to humans when they are inhaled because they will kill lung cells, which could lead to scarring and possible cancer.

What is it used for?

Uranium "enriched" into U-235 concentrations can be used as fuel for nuclear power plants and the nuclear reactors that run naval ships and submarines. It also can be used in nuclear weapons.

Depleted uranium (uranium containing mostly U-238) can be used for radiation shielding or as projectiles in armor-piercing weapons.

Where does it come from?

U-235 and U-238 occur naturally in nearly all rock, soil, and water. U-238 is the most abundant form in the environment. U-235 can be concentrated in a process called "enrichment," making it suitable for use in nuclear reactors or weapons.

What form is it in?

Uranium is an extremely heavy metal. Enriched uranium can be in the form of small pellets that are packaged in the long tubes used in nuclear reactors.

What does it look like?

When it has been refined and enriched, uranium is a silvery-white metal.

How can it hurt me?

Because uranium decays by alpha particles, external exposure to uranium is not as dangerous as exposure to other radioactive elements because the skin will block the alpha particles. Ingestion of high concentrations of uranium, however, can cause severe health effects, such as cancer of the bone or liver and kidney damage. Inhaling large concentrations of uranium can cause lung cancer from the exposure to alpha particles. Uranium is also a toxic chemical, meaning that ingestion of uranium can cause kidney damage from its chemical properties much sooner than its radioactive properties would cause cancers of the bone or liver.

For more information about U-235 and U-238, see the Public Health Statement by the Agency for Toxic Substances and Disease Registry at http://www.atsdr.cdc.gov/toxprofiles, *or visit the Environmental Protection Agency at* http://www.epa.gov/radiation/radionuclides/uranium.htm.

For more information about health effects related to uranium exposure, see CDC's fact sheet on "Radiation and Health Effects," at www.bt.cdc.gov/radiation/healthfacts.asp.

For more information on protecting yourself before or during a radiologic emergency, see CDC's fact sheet titled "Frequently Asked Questions (FAQs) About a Radiation Emergency" at

www.bt.cdc.gov/radiation/emergencyfaq.asp, *and "Sheltering in Place During a Radiation Emergency," at* www.bt.cdc.gov/radiation/shelter.asp.

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